WHAT IS CLAIMED IS:

1. A solid electrolyte, comprising an electrolyte solution and a crosslinked polymer that is being chemically crosslinked, wherein the electrolyte includes therein a gel phase, in which the crosslinked polymer is swelled with the electrolyte solution, and a separated phrase of electrolyte solution phase.

2. The solid electrolyte according to claim 1, wherein in the phase-separated structure, the electrolyte solution phase has a size of less than 20 μm.

3. A method of producing the solid electrolyte according to claim 1, comprising forming a phase-separated structure by increasing, in view of a relationship between a mass ratio of an amount of electrolyte solution/crosslinked polymer and a crosslink density, the crosslink density or the mass ratio of electrolyte solution/crosslinked polymer, to be in or over a range in which the electrolyte can be contained in a polymer chain.

4. The method according to claim 3, wherein in the phase-separated structure, the electrolyte solution phase has a size of less than 20 μm.

5. The method according to claim 3, wherein the degree of crosslinking of the crosslinked polymer is controlled by a combination of a low molecular weight compound having a single reaction point and a low molecular weight compound, which functions as a crosslinking agent, having two or more reaction points.

6. The method according to claim 5, wherein a homopolymer of the low molecular weight compound having a single reaction point contains a low molecular weight compound that is soluble in the electrolyte solution.

7. The method according to claim 5, wherein a (meth)acrylate monomer as the polymerizable low molecular weight compound is used.

8. The method according to claim 5, wherein ethylene dimethacrylate as the low molecular weight compound functioning as crosslinking agent is included.

9. The method according to claim 3, wherein the solid electrolyte is prepared, by dissolving a low molecular weight compound that is polymerizable by using heat, an optical polymerization initiator or the like in

the electrolyte solution in advance, and subjecting the resultant solution to polymerization reaction to form a crosslinked polymer.

10. The method according to claim 9, wherein the degree of crosslinking of the crosslinked polymer is controlled by a combination of a low molecular weight compound having a single reaction point and a low molecular weight compound, which functions as a crosslinking agent, having two or more reaction points.

11. The method according to claim 10, wherein a homopolymer of the low molecular weight compound having a single reaction point contains a low molecular weight compound that is soluble in the electrolyte solution.

12. The method according to claim 9, wherein a (meth)acrylate monomer as the polymerizable low molecular weight compound is used.

13. The method according to claim 10, wherein ethylene dimethacrylate as the low molecular weight compound functioning as the crosslinking agent is included.

14. A nonaqueous secondary battery comprising the

solid electrolyte according to claim 1.

15. The nonaqueous secondary battery according to claim 14, wherein the electrolyte solution phase included in the phase-separated structure of the solid electrolyte has a size of less than 20 μm.

16. A method of producing a nonaqueous secondary battery, comprising the steps of: assembling a negative electrode, a positive electrode and a separator into a final battery form, and performing the method of producing the solid electrolyte according to claim 3.

17. The method according to claim 16, wherein in the step of performing the method of producing the solid electrolyte, the solid electrolyte is prepared, by dissolving a low molecular weight compound that is polymerizable by using heat, an optical polymerization initiator or the like in the electrolyte solution in advance, and subjecting the resultant solution to polymerization reaction to form a crosslinked polymer.

18. The method according to claim 17, wherein the degree of crosslinking of the crosslinked polymer is controlled by a combination of a low molecular weight

compound having a single reaction point and a low molecular weight compound, which functions as a crosslinking agent, having two or more reaction points.

19. The method according to claim 18, wherein a homopolymer of the low molecular weight compound having a single reaction point contains a low molecular weight compound that is soluble in the electrolyte solution.

20. The method according to claim 17, wherein a (meth)acrylate monomer as the polymerizable low molecular weight compound is used.

21. The method according to claim 18, wherein ethylene dimethacrylate as the low molecular weight compound functioning as crosslinking agent is included.